Listing of the Claims

1. (Currently Amended): A compact fuel processor for converting a hydrocarbon fuel feed into a purified hydrogen rich gas, comprising:

   a reforming stack for converting the hydrocarbon fuel feed into a hydrogen rich gas, wherein the reforming stack includes a first plurality of cylindrical vessels, each of said first plurality of cylindrical vessels is ~~s~~ stackable without the need for connecting piping between each vessel; and

   a purification stack for producing the hydrogen rich gas suitable for direct feed to a fuel cell.

2. (Previously Amended): The compact fuel processor of claim 1, wherein the purification stack includes a second plurality of cylindrical vessels, wherein the plurality of cylindrical vessels are stackable without the need for connecting piping between each vessel.

3. (Original): The compact fuel processor of claim 2, wherein the reforming stack is aligned vertically.

4. (Original): The compact fuel processor of claim 1, wherein the reforming stack comprises a shift vessel, an autothermal reforming vessel, and an anode tail gas oxidation vessel; and wherein the purification stack comprises a preferred oxidation vessel, a first desulfurization vessel, and a second desulfurization vessel.

5. (Original): The compact fuel processor of claim 4, wherein the hydrocarbon fuel feed is sequentially introduced to: first, to the anode tail gas oxidation vessel to produce a preheated hydrocarbon fuel feed; second, to the first desulfurization vessel to produce a desulfurized hydrocarbon fuel feed; third, to the autothermal reforming vessel to produce a first intermediate hydrogen stream; fourth, to the second desulfurization vessel to produce a desulfurized intermediate hydrogen

stream; fifth, to the shift vessel to produce a second intermediate hydrogen stream; and sixth, to the preferential oxidation vessel to produce the hydrogen rich gas.

6. (Original): The compact fuel processor of claim 5, wherein the anode tail gas oxidation vessel comprises: an oxidation core containing a water gas shift catalyst for oxidizing fuel cell anode tail gas to produce a hot exhaust gas; and a first finned section having a plurality of external vertical fins surrounding the oxidation core for dissipating the heat of reaction produced within the oxidation core; wherein the hydrocarbon fuel feed is introduced to the first finned section to produce the preheated hydrocarbon fuel feed.

7. (Original): The compact fuel processor of claim 6, further comprising a heat exchanger for heating water with the hot exhaust gas to produce a preheated water stream.

8. (Original): The compact fuel processor of claim 5, wherein the autothermal reforming vessel comprises: a reforming core containing an autothermal reforming catalyst for reacting the desulfurized hydrocarbon fuel feed, the preheated water stream, and air to produce the first intermediate hydrogen stream; and a spiral exchanger section surrounding the reforming core; wherein the spiral exchanger section contains two channels for preheating the desulfurized hydrocarbon fuel feed with the first intermediate hydrogen stream.

9. (Original): The compact fuel processor of claim 5, wherein the shift reactor vessel comprises: a shift core containing a water gas shift catalyst for reacting the desulfurized intermediate hydrogen stream and water to produce the second intermediate hydrogen stream; and a second finned section having a plurality of external vertical fins surrounding the shift core for dissipating the heat of reaction produced in the shift core; wherein the desulfurized intermediate hydrogen

stream is preheated in the second finned section prior to being introduced to the shift core.

10. (Original): The compact fuel processor of claim 5, wherein the first desulfurization vessel comprises a desulfurization catalyst bed for substantially desulfurizing the preheated hydrocarbon fuel feed to produce a desulfurized hydrocarbon fuel feed.

11. (Original): The compact fuel processor of claim 5, wherein the second desulfurization vessel comprises a desulfurization catalyst bed for substantially desulfurizing the first intermediate hydrogen stream to produce a desulfurized intermediate hydrogen stream.

12. (Original): The compact fuel processor of claim 5, wherein the preferred oxidation vessel comprises: a preferred oxidation catalyst bed for reacting air and the second intermediate hydrogen stream to produce the hydrogen rich gas; and a heat exchange chamber for cooling the hydrogen rich gas with water in a cooling coil.

13. (Currently Amended): A compact fuel processor for converting a hydrocarbon fuel feed into a purified hydrogen rich gas, comprising:

a reforming stack for converting the hydrocarbon fuel feed into a hydrogen rich gas, wherein the reforming stack comprises a plurality of cylindrical modular units, each of said plurality of cylindrical modular units is ~~are~~ stackable, separable, and performs a separate operational function; and

a purification stack for producing the hydrogen rich gas suitable for direct feed to a fuel cell.

14. (Previously Added): The compact fuel processor of claim 13, wherein the plurality of cylindrical modular units of the reforming stack comprises a shift vessel, an autothermal reforming vessel, and an anode tail gas oxidation vessel.

15. (Currently Amended): The compact fuel processor of claim 13, wherein the purification stack comprises a plurality of cylindrical modular units, each of said plurality of cylindrical modular units is ~~are~~ stackable, separable, and performs a separate operational function.

16. (Previously Added): The compact fuel processor of claim 15, wherein the plurality of cylindrical modular units of the purification stack comprises a preferential oxidation vessel and a desulfurization vessel.